

## *Design Memorandum No. 02-2005*

TO: Engineering Offices and Divisions  
Districts  
Consulting Engineers

FROM: Mark S. Gaydos, P.E. – Design Engineer /s/

DATE: March 2, 2005

### Design Manual Reference:

Section III-14.06 and  
Section III-15.03 and  
Section IV-02.08

☒ Revision  
☐ Supplemental

SUBJECT: DEEP FILL AREAS (FILLS GREATER THAN 10') INCLUDING  
BOX CULVERTS IN DEEP FILL AREAS

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### **Introduction**

This memorandum provides additional guidance for deep fill areas (fills greater than 10').

### **Implementation**

The use of this guidance is to be implemented immediately.

### **Guidance**

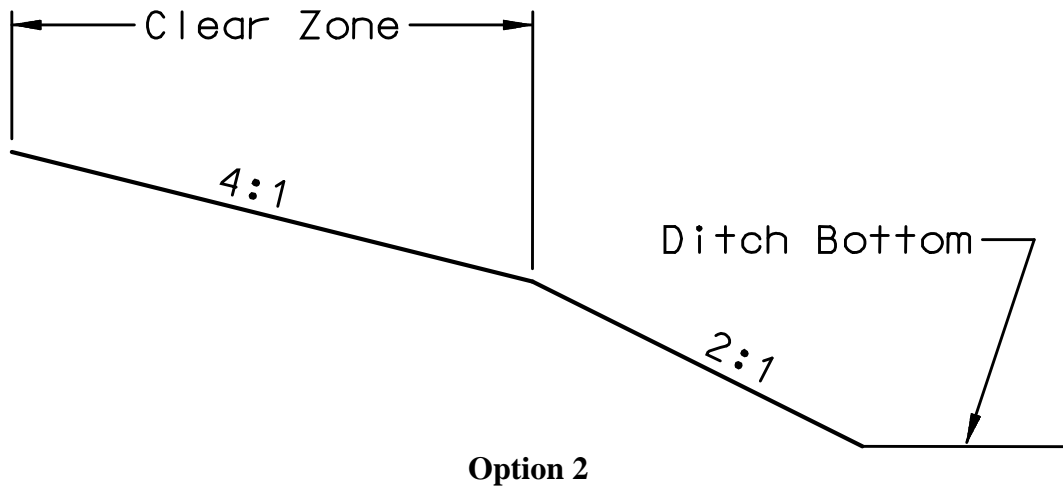
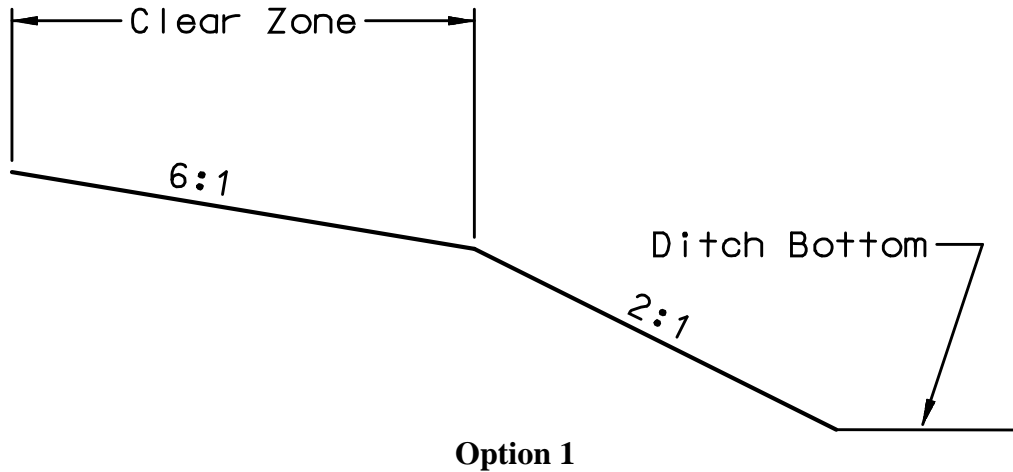
The foreslope in deep fill areas (fills greater than 10') will be based off of the ADT as shown in the Project Concept Report. The depth of the fill is measured from the toe of the foreslope at the tie in with the ditch bottom to the edge of the roadway. It is the Department's policy to flatten foreslopes even though the initial cost may be greater than guardrail. The decision to flatten the foreslope or to provide guardrail is an executive decision. Therefore, when the Project Concept Report is written, both the costs for guardrail and flattening slopes should be included. The option that should be chosen by the designer should be based off of cost effectiveness, least amount of right of way impacts, and least amount of wetland impacts. See attached Figure 18.

### **Deep Fill Areas**

If the ADT < 2000, one of the following options should be chosen:

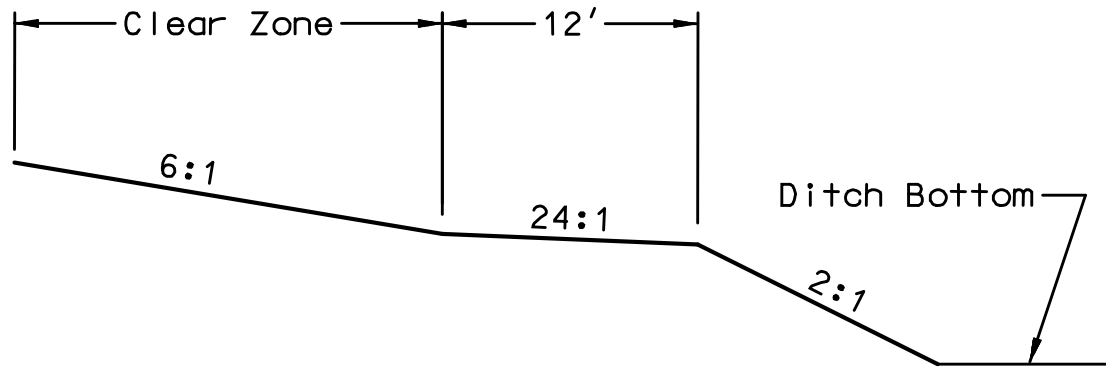
- Option 1: The foreslope to the clear zone will be 6:1 then 2:1 to the tie in with the ditch bottom.

- Option 2: The foreslope to the clear zone will be 4:1 then 2:1 to the tie in with the ditch bottom.

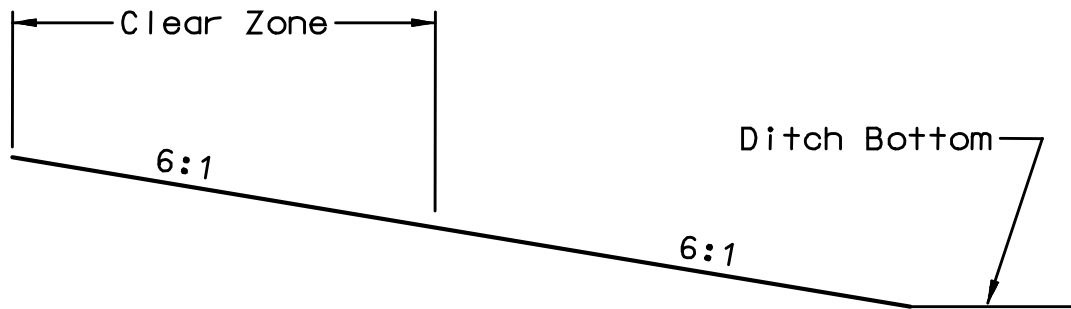


If the ADT > 2000, one of the following options should be chosen. Generally, Option 1 will be the most cost effective option. However, if Option 2 or 3 is more cost effective, and impacts less right of way and wetlands, then that option should be chosen.

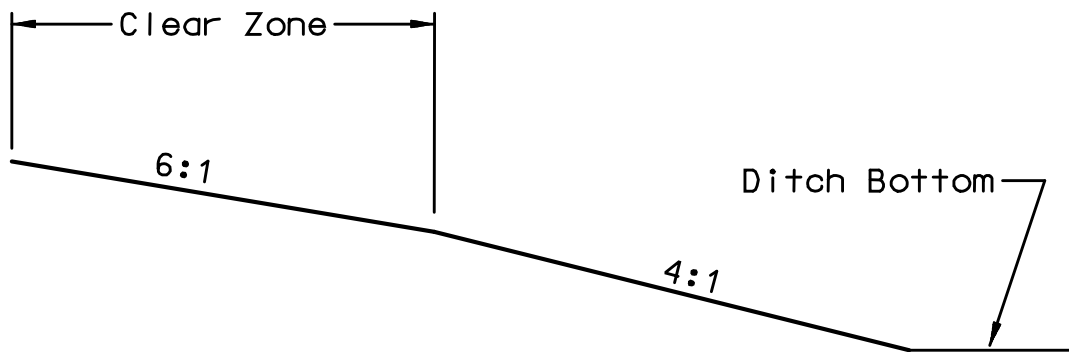
- Option 1: The foreslope to the clear zone will be 6:1, then a 12' bench at 24:1, then 2:1 to the tie in with the ditch bottom.
- Option 2: The foreslope to the clear zone will be 6:1 then continue the 6:1 to the tie in with the ditch bottom.
- Option 3: The foreslope to the clear zone will be 6:1 then 4:1 to the tie in with the ditch bottom.



Option 1



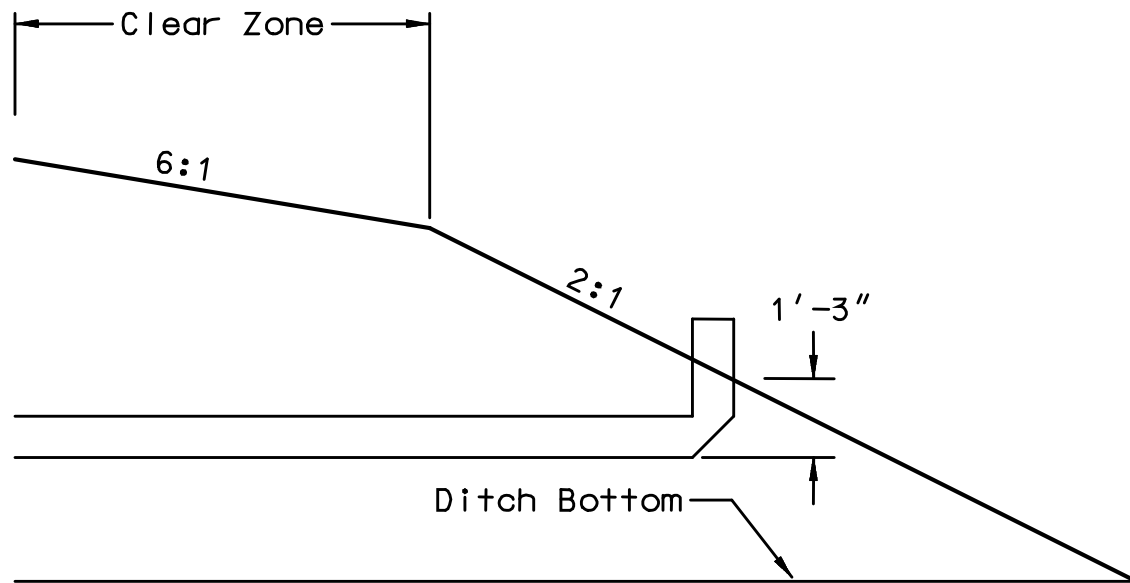
Option 2



Option 3

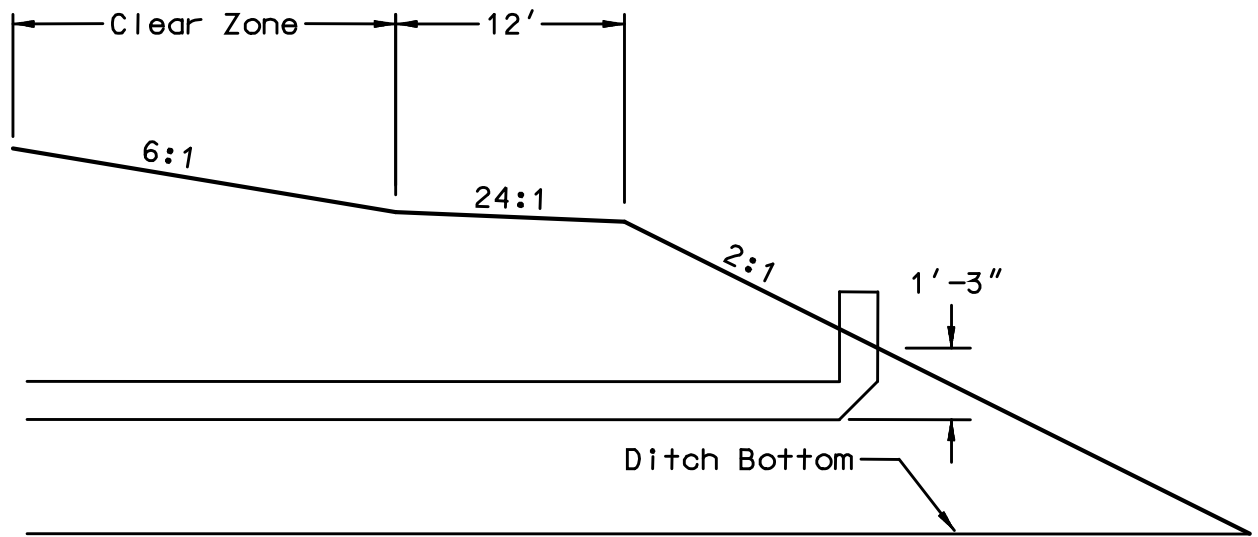
**Deep Fill Areas With Box Culverts**

If the ADT < 2000 and the box culvert is located in a deep fill area, the foreslope to the clear zone will be 6:1, then 2:1 to the tie point with the parapet. This will be the most cost effective. The fill depth is measured from the bottom of the ditch to the edge of the roadway. See the following figure. Check the final cross sections to determine the final length of the box culvert.

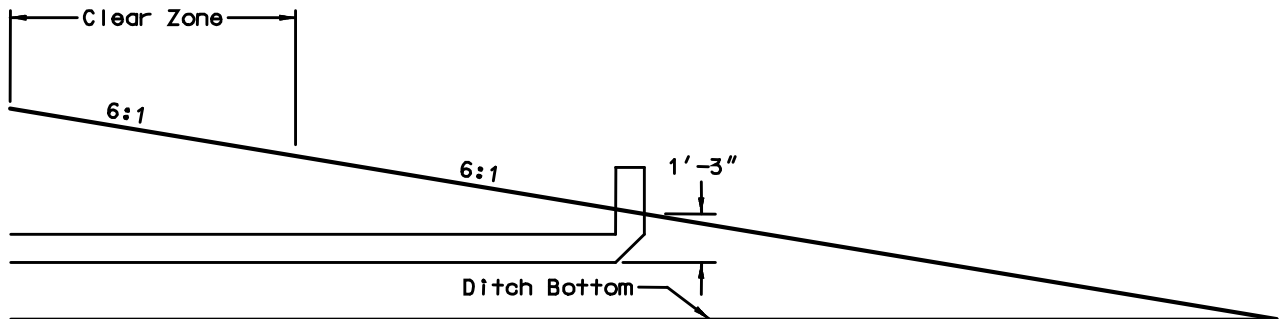


If the ADT > 2000 and the box culvert is located in a deep fill area, one of the following options should be chosen. The option that is the most cost effective and impacts the least amount of right of way and wetlands should be chosen. When choosing an option, consideration should also be given to the cross-section coming into and leaving the box culvert area and to the crash history in that area. The fill depth is measured from the bottom of the ditch to the edge of the roadway. See the following figures. Check the final cross sections to determine the final length of the box culvert.

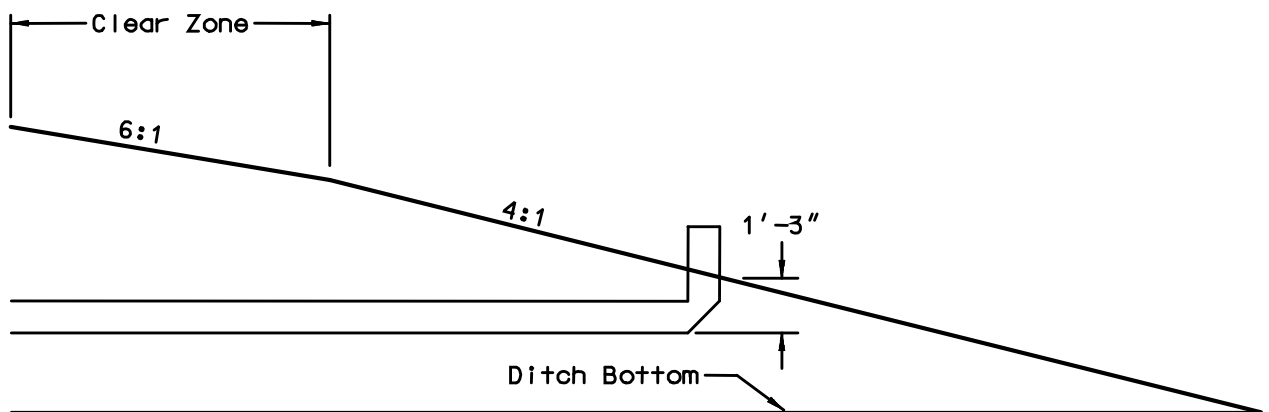
- Option 1: The foreslope to the clear zone will be 6:1, then a 12' bench at 24:1, then 2:1 to the tie in with the parapet.
- Option 2: The foreslope to the clear zone will be 6:1 then continue the 6:1 to the tie in with the parapet.
- Option 3: The foreslope to the clear zone will be 6:1 then 4:1 to the tie in with the parapet.



Option 1



Option 2



Option 3

**Questions**

Any questions regarding the content or implementation of the memorandum should be referred to Ron Henke, Design Division, 701-328-4445.

**Approved**

\_\_\_\_\_/s/\_\_\_\_\_  
Francis G. Ziegler – Director of Project Development

3/30/05  
Date

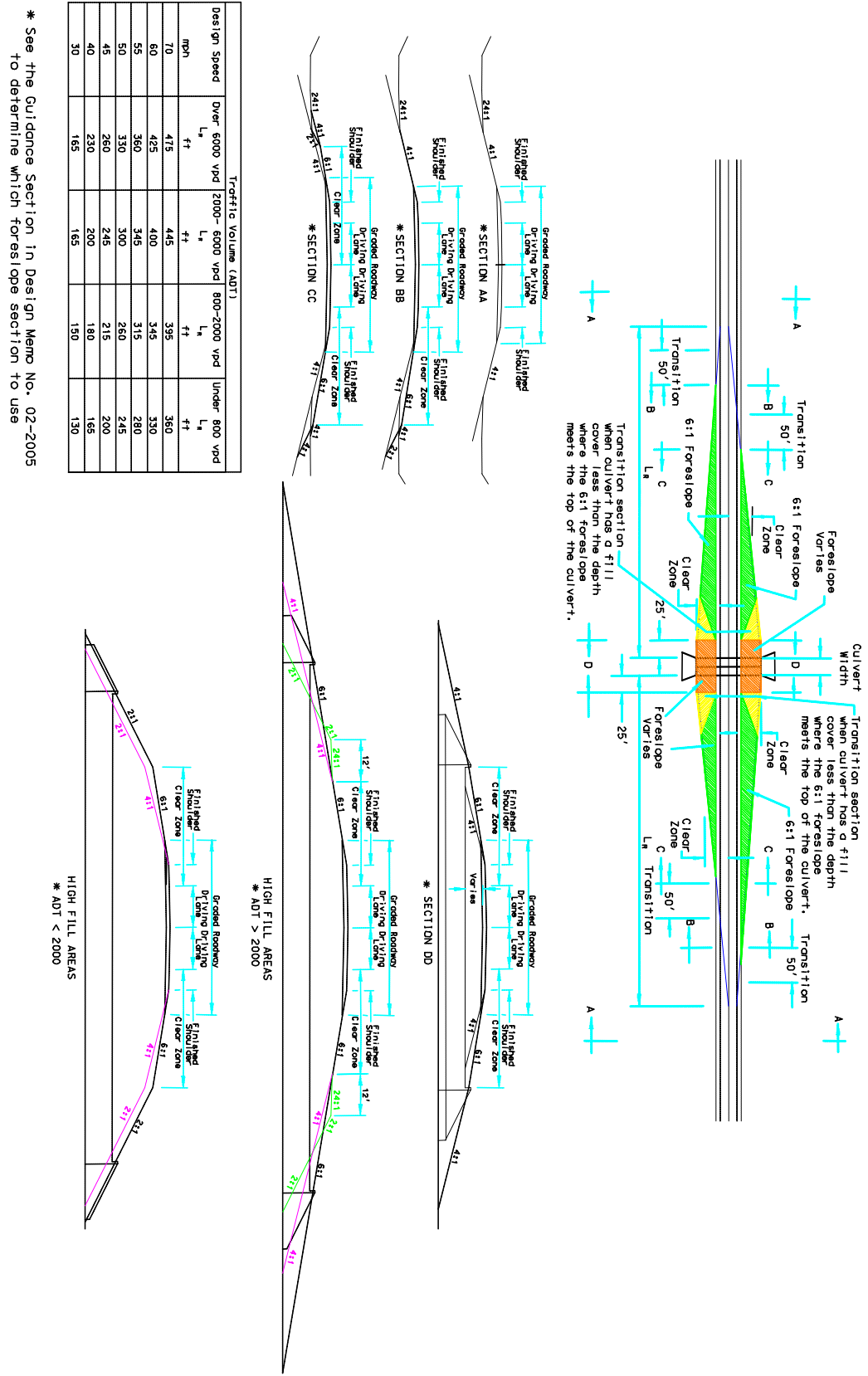


Figure 18